

### REMARKS

Claims 1, 9-11, 14-17, and 20-21 are currently pending. Applicant reserves the right to pursue the original claims and other claims in this and other applications.

Claims 1, 11, and 16-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Aritake et al. (US 5,872,590) in view of Tatsuzawa (US 6,441,844). This rejection is respectfully traversed.

In order to establish a *prima facie* case of obviousness “the prior art reference (or references when combined) must teach or suggest all the claim limitations.” M.P.E.P. §2142. Aritake and Tatsuzawa, even when considered in combination, fail to teach or suggest all of the limitations of independent claims 1, 11, and 16.

In claims 1, 11, and 16 object data comprises first and second objects. First objects are those objects being outside a stereoscopic viewable range of a stereoscopic display device in a 3D coordinate space. As such, the first objects are considered as being made of polygons having 3D coordinates and are clarified as being viewed in a planar view. Second objects are those objects being inside a stereoscopic viewable range of a stereoscopic display device in a 3D coordinate space. These objects are viewed in a stereoscopic view

For example, in FIGs. 3A-3F, objects 2 and 3 are first objects and object 1 is a second object. Objects 2 and 3 are positioned outside a stereoscopic viewable range of a stereoscopic display device in a 3D coordinate space; therefore, objects 2 and 3 are to be viewed in a planar view. Object 1 is positioned inside a stereoscopic viewable range of a stereoscopic display device in a 3D coordinate space; therefore, object 1 is to be viewed in a stereoscopic view. Accordingly, the object data of the first objects are converted to a reference camera coordinate system data with its origin at a reference camera. The object data of the second objects are converted to a parallax camera coordinate system data with their origins being at a parallax cameras for right and left eyes.

The converted reference camera coordinate system data and the parallax camera coordinate system object data for the right eye are drawn as image data for the right eye in a video memory. The converted reference camera coordinate system data and the parallax camera coordinate system object data for the left eye are drawn as image data for the left eye in a video memory. Then, the image data for the right and left eyes drawn in the video memory are synthesized and displayed on a stereoscopic display device as images mixing stereoscopic and planar objects.

Claim 1 recites a method for displaying stereoscopic images, comprising the steps of:

converting stored model object data of first objects, made of polygons having 3D coordinates, which are to be viewed in a planar view because of image formation positions being outside a stereoscopic viewable range of stereoscopic display device in a 3D coordinate to reference camera coordinate system data with its origin at a reference camera;

converting stored model object data of second objects, made of polygons having 3D coordinates, which are to be viewed in a stereoscopic view because of image formation positions being inside a stereoscopic viewable range of stereoscopic display device in a 3D coordinate to parallax camera coordinate system data for right and left eyes respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles;

drawing the reference camera coordinate system data and the parallax camera coordinate system data for right eye as image data for right eye in a video memory;

drawing the reference camera coordinate system data and the parallax camera coordinate system data for left eye as image data for left eye in the video memory; and

synthesizing the image data for right and left eyes drawn in the video memory and displaying, on a stereoscopic display device, images mixing first and second objects.

Aritake discloses that a:

position of an observer in a stereoscopic observing region is detected by a position detecting unit. A right-eye image and a left-eye image which are seen from the detecting position are formed by an image

forming unit and displayed on a display. By setting an aperture position of a projection optical system, the right-eye image is projected to the right-eye position of the observer and the left-eye image is projected to the left-eye position, thereby allowing a stereoscopic image to be observed. Further, an aperture is set so as to project the right-eye image or left-eye image to a position different from the detecting position of the observer, thereby allowing a same image to be seen to both eyes of another observer and allowing a two-dimensional image to be observed.

(Aritake, Abstract)

Aritake teaches a system in which one or more viewers can observe a stereoscopic image as moving, without any supplemental glasses, and viewers other than those observing the stereoscopic image can observe a clear two-dimensional image. Stereoscopic images or two-dimensional images can be observed by viewer, depending on the viewer's position. Aritake uses two real cameras, the left and right cameras, to capture and then subsequently display stereographic images.

Furthermore, Aritake discloses a display apparatus and method for detecting positions of eyes of one or a plurality of observers to allow a stereoscopic video image to be observed by a motion parallax of two eyes and for enabling other observers except an observer of a stereoscopic video image to observe a two-dimensional video image.

In the display apparatus of Aritake, 3D observation region 20 is set in a predetermined range in front of the screen 18 of the image display apparatus 10. When the right eye 38 and the left eye 40 of an observer exists in the 3D observing region 20, the observer receives the projections of different parallax images respectively, and can observe a stereoscopic image (Col. 9, line 64 – Col. 10, line 5), while an outer region of the 3D observing region 20 is a 2D observing region 36 in which a two-dimensional image can be observed. (Col. 10, lines 17-19) Thus, in the system of Aritake, it must be determined whether the right and left eyes of an observer exist in the 3D observing region 20.

Aritake does not disclose image formation positions being inside or outside a stereoscopic viewable range of a stereoscopic device in a 3D coordinate system. Accordingly, Aritake fails to

disclose “converting stored model object data of first objects, made of polygons having 3D coordinates, which are to be viewed in a planar view because of image formation positions being outside a stereoscopic viewable range of stereoscopic display device in a 3D coordinate to reference camera coordinate system data with its origin at a reference camera” and “converting stored model object data of second objects, made of polygons having 3D coordinates, which are to be viewed in a stereoscopic view because of image formation positions being inside a stereoscopic viewable range of stereoscopic display device in a 3D coordinate to parallax camera coordinate system data for right and left eyes respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles.” Aritake, to the contrary, is directed to capturing stereoscopic images. Thus, Aritake also fails to disclose “synthesizing the image data for right and left eyes drawn in the video memory and displaying, on a stereoscopic display device, images mixing first and second objects.” Thus, the invention of Aritake is different from the claimed invention.

Tatsuzawa discloses:

Left and right video cameras ... disposed on both sides of a front video camera.... Solid-pictorial video signals used upon signal transmission are generated by using video signals outputted from the left and right video cameras with respect to a video signal outputted from the front video camera. The left and right video cameras make use of simplified video cameras and are cameras with no zoom functions or the like. The video signals obtained from the left and right video cameras are used as signals for forming a solid picture. In the present example, only solid information with respect to a main picture is transmitted as a video signal to reduce the amount of transmission. A motion-compensated DCT encode process using the front video signal as a reference picture is performed to extract only the video signal having the solid information from the left and right video signals. Since the simplified video cameras can be utilized, solid-pictorial video signals can be generated at low cost.

(Tatsuzawa, Abstract)

Tatsuzawa discloses a video data generating system, in which video data for a stereoscopic view can be generated with low cost. In the system of Tatsuzawa, a front camera, used as reference camera, and simple view cameras to the left and right of the reference camera, are applied on a

video signal output from the front camera to generate video signals for the stereoscopic view; as simple cameras only produce low quality pictures. The system of Tatsuzawa is to be used to display a stereoscopic view of a real space. Tatsuzawa teaches that only one object is captured by the reference, left and right cameras.

Tatsuzawa fails to disclose “converting stored model object data of first objects, made of polygons having 3D coordinates, which are to be viewed in a planar view because of image formation positions being outside a stereoscopic viewable range of stereoscopic display device in a 3D coordinate to reference camera coordinate system data with its origin at a reference camera” and “converting stored model object data of second objects, made of polygons having 3D coordinates, which are to be viewed in a stereoscopic view because of image formation positions being inside a stereoscopic viewable range of stereoscopic display device in a 3D coordinate to parallax camera coordinate system data for right and left eyes respectively with their origins at parallax cameras for right and left eyes having predetermined parallax angles.” Firstly, Tatsuzawa only discloses a single object 12, thus, at the very least, Tatsuzawa cannot disclose “converting first [and] ... second objects” (emphasis added).

Additionally, Tatsuzawa indicates that reference camera coordinate system data for the right and left eye may be drawn in memory, but Tatsuzawa fails to disclose “drawing the reference camera coordinate system data and the parallax camera coordinate system data for right eye as image data for right eye in a video memory” and “drawing the reference camera coordinate system data and the parallax camera coordinate system data for left eye as image data for left eye in the video memory.” The video signal of an image obtained by the camera 18M of Tatsuzawa has no 3D coordinates because the camera 18M is single, and there is no need of converting the video signal to any reference camera system data or parallax camera coordinate system data, nor does it disclose performing this type of converting. Thus, Tatsuzawa fails to disclose “synthesizing the image data for right and left eyes drawn in the video memory and displaying, on a stereoscopic display device, images mixing first and second objects” because image data for right and left eyes drawn in memory could not include the reference camera coordinate system data if applying the teachings of

Tatsuzawa. Thus, the rejection of claim 1 should be withdrawn and claim 1 and its dependant claims allowed over the combination of Aritake and Tatsuzawa.

Claim 11 recites, *inter alia*, “a geometry unit for converting object data of first objects made of polygons having 3D coordinates, which are to be viewed in a planar view because of image formation positions being outside a stereoscopic viewable range of stereoscopic display device in a 3D coordinate to reference camera coordinate system data with its origin at a reference camera” and a “rendering unit for synthesizing the image data for right and left eyes drawn in the video memory, wherein a stereoscopic display device is provided that displays images mixing first and second objects using image data for right and left eyes synthesized by the rendering unit.”

Claim 16 recites, *inter alia*, “allowing the geometry unit to convert object data of the first objects which are to be viewed in a planar view because of image formation positions being outside a stereoscopic viewable range of stereoscopic display device in a 3D coordinate to reference camera coordinate system data with its origin at a reference camera and “synthesizing the image data for right and left eyes drawn in the video memory and displaying, on a stereoscopic display device, images mixing the first and second objects.”

Thus, claims 11 and 16 have similar claim limitations as claim 1 and are allowable for at least the reasons noted above with respect to claim 1.

Claims 12 and 13; and 17 and 18 depend from claim 11 and 16, respectively, and are allowable for at least the reasons noted above with respect to claims 11 and 16.

Claims 9-10, 14-15, and 20-21 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Aritake in view of Tatsuzawa, and further in view of Hoglin (U.S. Pat. No. 5,949,477). This rejection is respectfully traversed.

Claims 9-10 depend from claim 1 and are patentable over the Aritake and Tatsuzawa combination at least for the reasons mentioned above. Claims 14-15 depend from claim 11 and are patentable over the Aritake and Tatsuzawa combination at least for the reasons mentioned above.

Claims 20-21 depend from claim 16 and are patentable over the Aritake and Tatsuzawa combination at least for the reasons mentioned above.

Further, Hoglin discloses a:

three-dimensional stereoscopic system using two camera units mounted onto a sub-base and each camera unit mounted onto a moveable base. The bases rotate and are synchronized to turn with each other to control the horizontal viewing angle. Both camera units are synchronized to scan an image source in unison. The video signals from the camera units are loaded into a switching unit which alternatively outputs information from one camera unit and then the other camera unit. In this manner, both a left eye view and a right eye view are transmitted to a television monitor to be viewed as a stereoscopic image.

(Hoglin, abstract)

With respect to claim 1, Hoglin fails to disclose “converting stored model object data of first objects, made of polygons having 3D coordinates, which are to be viewed in a planar view because of image formation positions being outside a stereoscopic viewable range of stereoscopic display device in a 3D coordinate to reference camera coordinate system data with its origin at a reference camera.” Hoglin, to the contrary, is directed to capturing stereoscopic images. Thus, Hoglin also fails to disclose “synthesizing the image data for right and left eyes drawn in the video memory and displaying, on a stereoscopic display device, images mixing first and second objects.” Thus, the teachings of Hoglin are different from and do not cure the deficiencies of Tatsuzawa and Aritake. Thus, the rejection of claims 9-10 which depend from claim 1 should be withdrawn and are patentable over Tatsuzawa, Aritake, and Hoglin.

Nor is there provided in the references any motivation to combine their teachings. Even if there was motivation provided in the references to combine their varied teaching, which there is not, the combination of Tatsuzawa, Aritake, and Hoglin still would not achieve the claimed invention for at least the reasons noted above. Thus, the rejection of claim 1 should be withdrawn and claim 1

and its dependant claims allowed over Tatsuzawa, Aritake, and Hoglin for at least the reasons cited above.

As noted above, claims 11 and 16 have similar claim limitations as claim 1 and are allowable over Tatsuzawa, Aritake, and Hoglin for at least the reason noted above with respect to claims 1 and 9/10.

Claims 12 and 13; and 17 and 18 depend from claim 11 and 16, respectively, and are allowable over Tatsuzawa, Aritake, and Hoglin for at least the reasons noted above with respect to claims 11 and 16.

In view of the above, Applicant believes the pending application is in condition for allowance.

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